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ΛCDM is alive and well

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The concordance model in cosmology, ΛCDM, performs extremely well in accounting for most current cosmological observations with high accuracy.
However, the model faces several tensions with recent cosmological data and their increased accuracy. The discrepancy between the values of the Hubble constant H0 obtained from direct distance scale measurements and the cosmic microwave background (CMB) is the most statistically significant, but the amplitude of the matter fluctuations is also considered a serious concern.
I will review the current situation. First, I will show that the combination of several recent measurements from local probes leads to a tight constraint on the current matter density ΩM as well as on the amplitude of matter fluctuations, both in good agreement with the values deduced from the CMB. Secondly, I will treat the Hubble tension by assuming that some determinations of the value of H0 are possibly biased and statistically compare these "ΛCDM+ H0 bias" models to alternative cosmological models. I find that the former can statistically outperform the extended models proposed so far.
Finally, I illustrate that the recent Pantheon+ results combined with the inferred SH0ES value lead to a value of the reduced cosmological density parameter, ⌧⌧ that conflicts with the inferred CMB value for the LCDM model. The situation does not really improve with the alternative models twisted to resolve the Hubble tension.

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